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# Participatory land-use planning: Integrating expert-oriented and community-based tools for sustainable land management in Kilimanjaro Region

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**ABSTRACT**
Tanzania like other countries globally has witnessed a paradigm shift in natural resource planning and management from state-centric to community based approach. The shift was inevitable following the experienced inadequacies of the state capacity in-terms of human and financial resources to manage natural resources in a sustainable way, which in turn exacerbate natural resource degradation. It was consequently envisaged that giving people stake in the planning and management endeavors would help fill the gap. While the manifestation of this shift in the country started since the mid-1990s, little empirical evidence exists on the value of participatory land use planning in ensuring sustainable management of natural resources. This study provides an account on the way participatory land use planning through Sustainable Land Management (SLM) project in Kilimanjaro region has integrated expert-oriented (GIS) and community-based (PRA) tools as a move towards sustainable land management in the region.
**Keywords**: community *viz* expert oriented tools, participatory land use planning, sustainable management, Kilimanjaro, Tanzania

## INTRODUCTION

Planning and participation are inseparable entities as prerequisites for sustainable management of land resources. Evidence exists showing that the intended goals of land use planning become more efficiently achieved when all stakeholders including extension workers, researchers, farmers and decision makers participate in decision making over land at various stages such as planning, development, implementation and monitoring (Gabathuler et al, 2009). Similarly, involvement of stakeholders brings about integration and effective communication between local and regional/landscape scales. Thus adds value because effects from land use practices are cross-scale and far-reaching, and the land planning and management decisions made at these different levels are complementary (Gabathuler et al, 2009). Therefore stakeholders' involvement enhances effective decision making on land use planning as a way towards ensuring sustainable land management (Majani et al., 2005).

Until the early 1990s, however, land use planning was top-down dominated by the state; the role of the communities in the planning process was ignored. This is the legacy that was adopted from the colonial times and sustained by the Tanzanian government following the political independence of the country in the early 1960s. Participatory approach was pioneered by an era whereby land use and planning was based on fragmented ethnic frameworks wherein each tribe had its own way of planning the use of land under its jurisdiction (Noe, 2003). The centralized planning era views the local people as not having a stake in the management of land resource apart from considering them a threat to sustainable land management (Hardin, 1968). It is characterized by its inadequacy to consider interests over land of all the relevant stakeholders and consequently providing rights to some powerful actors while marginalizing those of other actors thus fueling conflicts amongst the differentiated land users (Songoro, 2014). This land use planning approach consequently leads to the use of force to ensure that the local people follow what is advocated by the government through its top-down approach, and the effectiveness of attaining the intended targets thus becomes inadequate, and the plans appear to be unrealistic if the primary users are not integrated in the planning process. The example of such planning is the 1970s villagization programme that sought to settle the people in state-designed villages in Tanzania but ended up not realizing the purpose it had intended to attain.

Kombe and Kreibich (2001) argue that for many years to come, developing countries including Tanzania will not be able to provide the necessary resources required to ensure serviced, planned and legal land use planning. In other words, the authors appreciate how the role of the local people in land use planning is irreplaceable as the government is inefficient in terms of its lack of effective institutional arrangement and adequate resources necessary to ensure effective implementation of land use planning. This argument rationalizes the urge for integrating the local

 

people into land use planning as a crucial partner to reduce the burden on the side of the governments. As a result of the state's inadequacies, researchers have been advocating for participatory land use planning since the mid1990s (Kauzeni et al., 1993). Participatory land use planning has foundation on international summits held in the Rio de Janeiro Brazil in 1992 and in Italy in 1996 which advocated for holistic, integrative, and participative management of natural resources implying that multiple stakeholders, natural resources and land uses have to partake in the planning process to enhance the attainance of sustainable land management (Kutter and Ulbert, undated).

Involvement of the local people including farmers bridges the long standing divide in terms of planning through top-down fashion by government bureaucrats and the local people who largely enforce their cultural based traditional land management knowledge systems (Kauzeni et al., 1993). According to Amler et al. (1999) land use planning always exists in any society even when such the society is not aware of it. This implies that parallel systems of land use planning may exist at the same temporal point, one owned by the state and another by a particular community, thereby resulting into manifestation of conflicts, duplication of efforts, and disharmony, among others. Such parallelism is subtle hence no measures are often taken to eliminate duplication of effort that it causes.

Sustainable land management as integration of land, water, biodiversity and environmental management strives to ensure that achievement of livelihoods interests goes along with sustenance of the environmental services (World Bank, 2006). It is linked with participatory land use planning in that the latter aims at bringing about sustainable land management and a balance of interests at local and landscape levels. The planning tool serves as a vehicle for addressing challenges such as food insecurity, climate change, economic stagnation, biodiversity degradation, and land use conflicts, among others, at local and landscape levels (GIZ, 2012). As such, participatory land use planning is a tool imperative for ensuring sustained land management and hence sustainable rural development.

Recognizing the importance of participation in land-use planning, the Sustainable Land Management (SLM) employed it as a tool in its attempt to combat land degradation and deforestation in the in Kilimanjaro Region. The SLM project is co-funded and co-managed by the Government of Tanzania, Global Environmental Facility (GEF), and United Nations Development Programme (UNDP). It is a 4-year project aiming at reducing land degradation on the highlands of the Kilimanjaro region. The project has come as a response to land degradation and deforestation experienced in the region due to a myriad of factors entailing socio-economic, demographic and market-based drivers. Participatory efforts have attempted to involve the local people, government officials and researchers in the process of land management and formulation and designing tools for combating land degradation while at the same time building the capacity of the local people to ensure ownership and hence sustainability of the land management processes even beyond the project timeframe (UNDP, 2010).

The purpose of the this paper is to show how synergy can be built between social science methods such as Participatory Rural Appraisal[1] (Chambers, 1994) and purely analytical tools such as geo-spatial analyses to address the land degradation problem using the case of Sustainable Land Management (SLM) Project in Kilimanjaro region. Lessons from the SLM project can be used to plan and address similar problems in Tanzania and elsewhere.

## MATERIAL AND METHODS

### Description of the study area

The study was carried out in Kilimanjaro region, Tanzania. The region is located in the North-eastern part of Tanzania (Figure 1). It lies between Latitudes $2^0$ 25' and $4^0$ 15' South, and between Longitudes $36^0$ 25' 30'' and $38^0$ 10' 45'' East. The region is bordered by Kenya on the North, Arusha region on the North-West, Manyara region on the West, and Tanga region to the South-East. Main relief features in the region include Mt. Kilimanjaro with a snow covered peak at (5,895 m.a.s.l) and the Pare Mountain ranges running from North-West of Mwanga district to South-East of Same district.

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Participatory Rural Appraisal is a family of approaches and methods that enable local people to share, enhance and analyse their knowledge and conditions, then plan and act accordingly. It entails among other methods, participatory resource mapping, seasonal calendars, modeling, scoring, ranking, and diagramming.

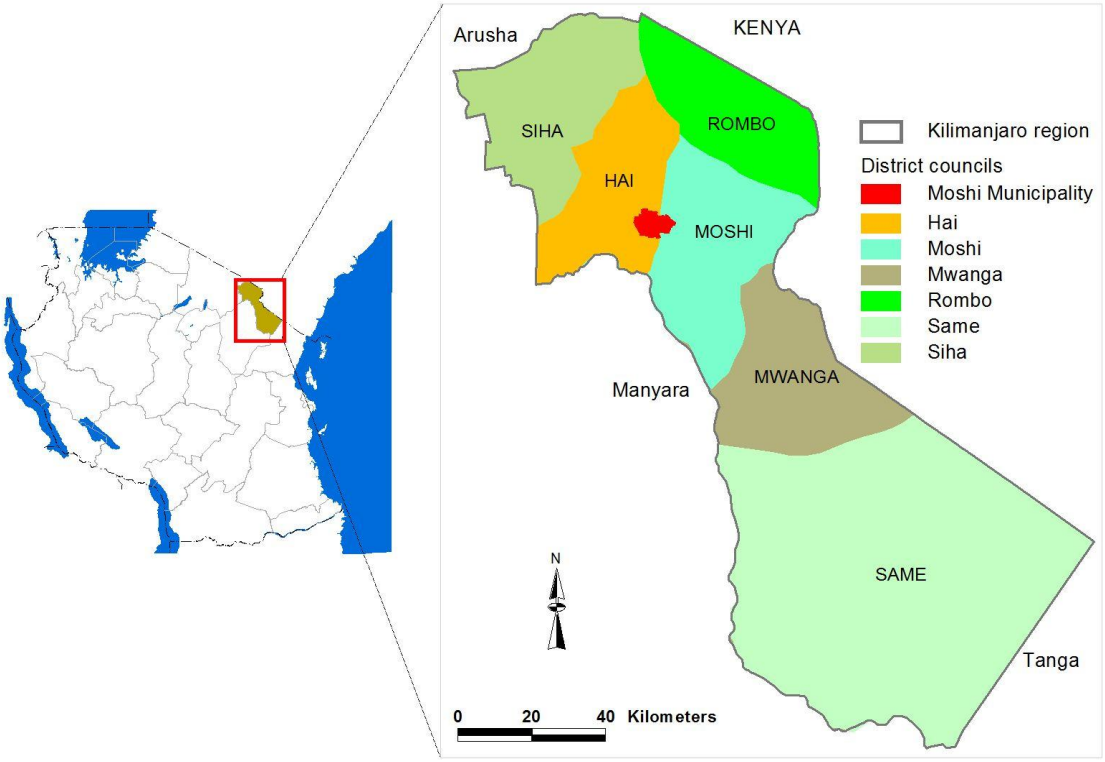



**Figure 1: Location Map Showing Sustainable Land Management (SLM) Project Area in Kilimanjaro Region, Tanzania**

This study specified three topo-sequence zones in the project area of Sustainable Land Management (SLM) project in Kilimanjaro region. These were Upland zone (1200-1900 m.a.s.l) with three villages of Shighatini (Mwanga District), Ushiri (Rombo District), and Manio (Siha District); Midland zone of moderate altitude (900-1200 m.a.s.l) with two villages of Roo (Hai District) and Sango (Moshi Rural District); and Lowland zone (500-900 m.a.s.l) with two villages of Mnazi (Moshi Urban) and Mabilioni (Same District). Due to differences in topo-sequence, these three categories of villages had different characteristics in terms of agro-ecology and socio-economic activities. For example, there were more conservation agriculture and less free grazing in the uplands compared to the mid and lowlands. Thus, the three zones were considered to have different natural resource management strategies due to differences in land degradation levels. The topo-sequence zones allowed exploration of land degradation, participatory efforts and its potential in all the heterogeneity within the region.

**Study design and data collection methods**

This study employed multiple-methods to provide a room for complementarity, confirmation and triangulation of the data collected through other methods. The methods entailed: (i) participatory rural appraisal (PRA) including focus group discussions and key informants interviews (ii) the use Geographic Information System (GIS) to capture and analyze trends of land degradation and conservation and to produce maps in that respect (iii) desk review of relevant publications at the global, national and local levels including scientific papers, decision making reports, and reports collected at the local offices, and (iv) field observation whereby through transect walks it was possible to witness the field reality in terms of land-uses and statuses thereof and action that were taking place in relation to the observed situation. Cross-sectional research design was employed to collect data. The use of this design enabled gathering of the data from the study area at single points in time, which helped to reduce cost.

**Participatory Rural Appraisal**

Using Participatory Rural Appraisal (PRA), researchers worked in a structured but flexible way with rural communities. PRA enhanced the stimulation of participation by the local people (Townsley, 1996). Using this approach, villagers with a minimum level of formal education comfortably participated during the exercises providing the assurance of getting useful information in a relaxed conversation. These tools promoted interactive learning, sharing knowledge and flexible structured analysis. The techniques used under the PRA entailed resource mapping,

focus group discussions and transect walks. Resource mapping was used to engage the farmers in drawing the map of resources and land uses found in the SLM project area. This aided their assessment of the land condition under different land uses. PRA-based maps were used as an instrument for triangulating and complementing the GIS-based maps which were prepared by the GIS expert. Focus group discussions were used to find out from the farmers perspectives initiatives that had been taken by SLM project to address land degradation and to triangulate the data collected using resource mapping. Transect walks enabled the researchers to eyewitness land conditions under various land uses while posing questions to and receiving responses from farmers. This enabled gaining a comprehensive picture of the land resource condition vis-à-vis the efforts that had been made by SLM project to address land degradation.

**Data Analysis**

Although not a participatory method *per se*, the collected data were analyzed using geo-spatial technique, GIS software (ArcView and ArcGIS) and content analysis technique. Geo-spatial analysis was employed to verify and complement local knowledge of land degradation as part of the process of integrated land-use planning. GIS technology (Rambaldi and Weiner, 2004, Rambaldi et al, 2006) were used to combine a range of geo-spatial information management tools and methods. These included participatory sketch maps, Google satellite images, GPS records/data and GIS maps to present people's spatial knowledge, land cover or land use features, and natural resources in GIS layers and maps. The maps were used as interactive vehicle for spatial learning, discussion, analysis, decision making and advocacy. Land use and land cover change detection was done using various overlay analysis and algorithms available for change detection analysis using ArcView software (ESRI, 1996). Post-classification comparison approach (Zhang and Lu, 2009) was used to detect the land use or land cover change between 1995 and 2014 periods. PRA data were analyzed on two levels. After each PRA session, a preliminary analysis was carried out involving farmers in the field. Through this way, it was possible to find errors that could be collected (Chambers, 1994). At a later stage, data collected through PRA tools of focus group discussion and transect walks were analyzed thematically through content analysis technique.

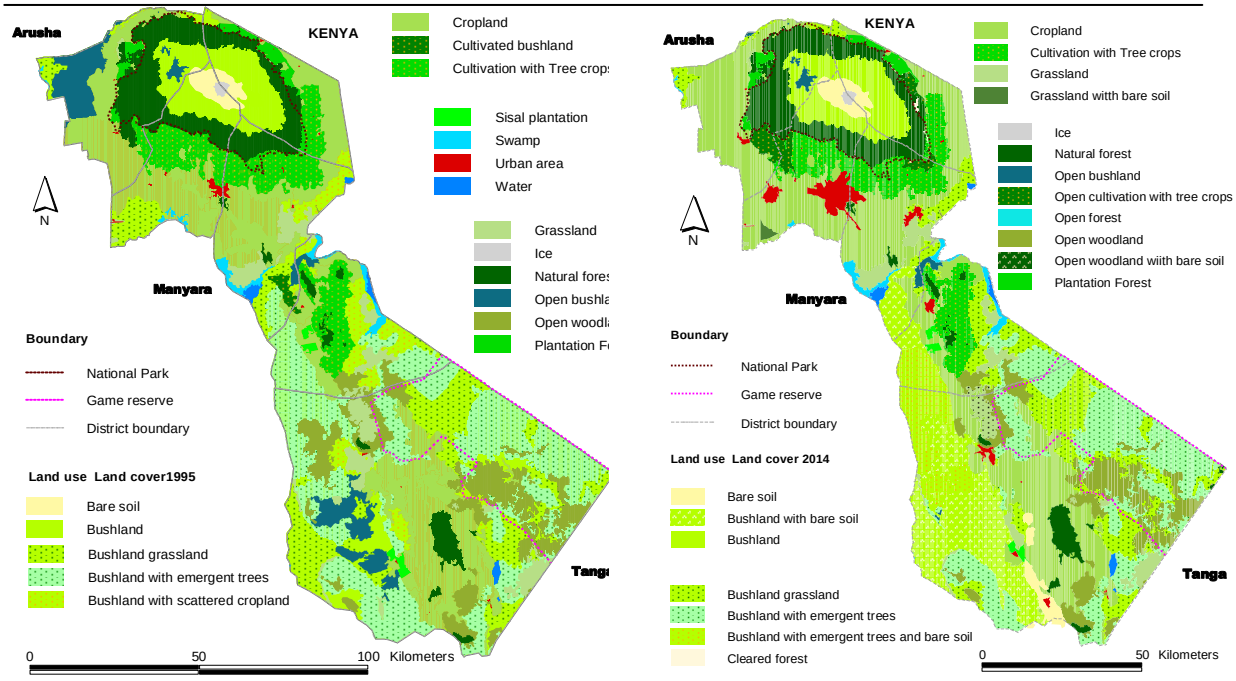
**RESULTS AND DISCUSSION**

Based on expert knowledge, GIS tool was used to develop temporal land use maps in Kilimanjaro region which are indicated in Figure 2. This map estimated land use changes that had taken place in Kilimanjaro region since the year 1995 to the year 2014. Based on this map, bare soil and bush land with emergent trees are the two new land use classes in 2014. Specifically, based on the GIS-based maps the major land use/cover change from 1995 to 2014 were: increase of agricultural land from 35.6% to 37%; decrease of forest land from 9.8% to 9.3%, decrease of bushland, bushland grassland, bushland with emergent trees and open bushland from 40.2% to 29.9%, and increase in bare soil from 1.0% to 15.6%. In general there was an increase in bare soils from bushland.

On the other hand, Figure 3 presents a village sketch map which was drawn by local people through the participatory mapping and PRA exercise. The PRA generated village maps were afterwards transferred into GIS indicated by Figure 4. Local people discussed and agreed regarding the major land uses in their area as including grazing land as well as livestock infrastructures, rain-fed and irrigated agricultural land, major water systems and settlements. Land degradation challenges were also identified as including soil erosion, landslides and decrease of vegetation cover leading to sheet and gully erosion. Causes of land degradation were mentioned to include mining (gypsum, boxite, tanzanite, gravel, sand) in lowland and highland areas, overgrazing in lowland areas, poor farming practices e.g. non use of conservation structures such as terraces in mountain slopes, charcoal making, poor soil structure especially in the lowlands, haphazard livestock grazing in highlands, unplanned and illegal tree cutting/harvesting, change of mode of production from coffee with tree sheds to maize and harvesting of nursing trees in coffee gardens, population increase-leading to expansion of areas for settlements and agriculture in highlands.

Participatory land use planning through Sustainable Land Management (SLM) project has thus integrated expert-oriented and community-based tools in the planning process to ensure sustainable land management. This integration has been operationalised through updating of land-use maps (1995) using GIS mapping tools and PRA-based mapping exercise. This updating rests on the fact that land-uses and management practices are not static but rather keep on changing from time to time as influenced by various drivers including demographic pressure, socio-economic reasons, market pressure and environmental influence. As such, land use maps updating is important from time to time at both landscape level covering the whole Kilimanjaro regions and local level such as covering specific districts or villages. The use of GIS-based and community-based methods integrates expert-based and indigenous knowledge systems as an important step towards ensuring sustainable management of land resources. The use of this integrated planning approach ensures mitigation of the weaknesses of these two knowledge systems in land use planning and, on the other hand, strengthens the individual methods by creating a synergistic outcome in land use planning and sustainable management of land resource that is higher than single knowledge systems can attain.




(a) Land use map for 1995 (b) Land use map for 2014

**Figure 2: Temporal land use changes in Kilimanjaro region from 1995 to 2014 based-on expert oriented GIS mapping.**


**Figure 3: Resource map drawn through participatory mapping and PRA exercise**

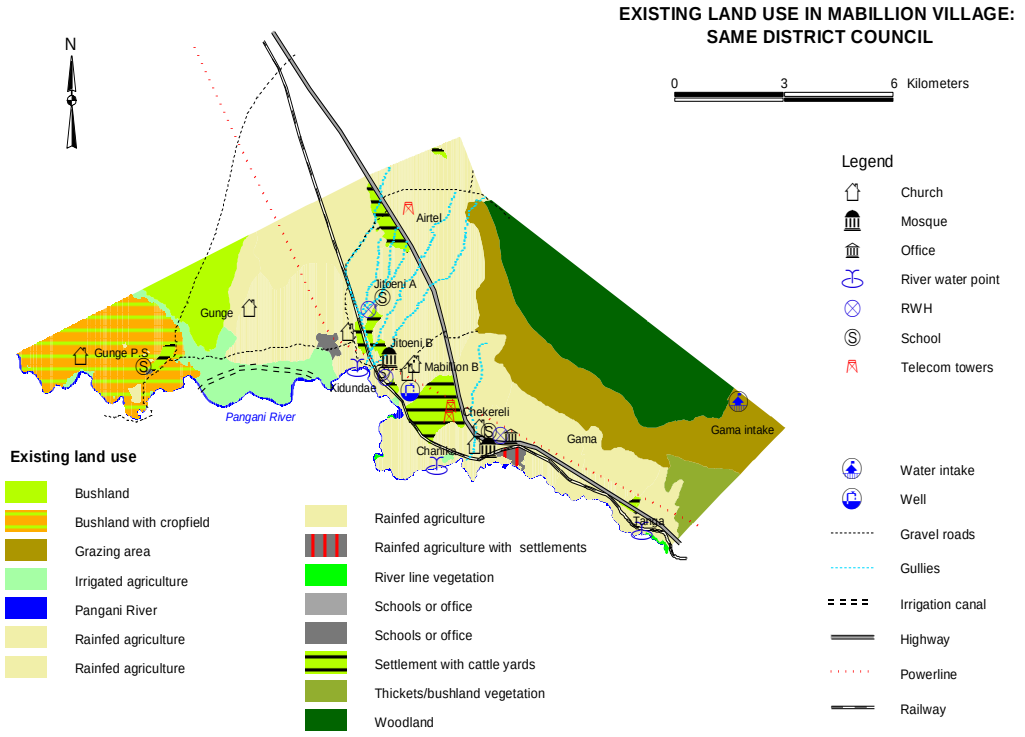



**Figure 4: Village land use maps drawn by a GIS-expert as an update of PRA maps drawn by the farmers/local people in the village.**

The updating of land use maps (decision making tools) involved training of stakeholders using both expert-based and PRA-based techniques. The exercise involved seventy representatives from four village committees (environment, land use, water, and women) These representatives were prepared to become trainers to the rest of the communities. Thus, the SLM project employed the use of *"training of trainers"* approach through *"learning by doing"*. A total of 70 local people 10 from each of the seven villages were trained to become community-based trainers or *para-professionals*. Apart from local people, bureaucrats including district facilitation teams (DFTs), village executive officers and village chairpersons, and technical persons including village extension officers were also involved in the capacity building activities. Thus, by combining the farmers, technical and procedural leaders in the empowerment process, synergistic relationships were established to bridge policy and practice domains and define independent and interdependent responsibilities and authorities as a way towards enhancing successfully achievement of participatory land use planning.

## CONCLUSION AND RECOMMENDATIONS

Participatory land use planning through Sustainable Land Management (SLM) project in Kilimanjaro region has portrayed the paradigm shift from centralized top-down to collaborative bottom-up planning and decision making on the use of land resources. The participatory planning process has added value by integrating expert-based and community-based tools and knowledge as an important move towards achieving synergistic outcome in sustainable land management. This integration reduces the weakness of the individual (expert or community) levels and in-turn pools their strengths. The process has also been inclusive by involving various strata of decision making including community representatives, natural resource committees at the local level, and district facilitation teams (DFTs). The sustainability aspect was also emphasized through the use of training of trainers approach whereby a section of local people were equipped with knowledge on integrated land use planning.

This paper recommends that land use managers should promote the use of integrated community-based (e.g. PRA) and expert-oriented (e.g. GIS) decision making tools in their planning and operationalisation of sustainable land management. It is further recommended that more studies be conducted on the interaction between expert-based and people-centred decision support tools for sustainable management of natural resources in Tanzania so as to come up with more concrete recommendations.

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